Venue

The winter school will be held at the international conference centre of ETH Zürich "Centro Stefano Francini" (CSF) on the fascinating hill above Ascona called Monte Verità. The center comprises various conference rooms, a hotel, a restaurant with panoramic view, a century-old park of 70000 m², natural trails and a tennis court. The unique microclimatic characteristics in the sunny southern part of Switzerland create a Mediterranean and particularly reposeful atmosphere. (**www.csf.ethz.ch**)

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From the airport to Locarno

Conferees from abroad usually enter Switzerland at Zurich International Airport. You then have the choice between a domestic flight over the Alps to Lugano Airport (half an hour flight followed by another hour train to Locarno) and a three-hour train ride on the scenic Gotthard route that will take you directly to Locarno. Alternatively, you can fly to Milan Malpensa International Airport and then proceed to Locarno by coach or train (Malpensa Express to Milan, train to Bellinzona–Locarno; Giosy Tours to Bellinzona, train to Locarno).

Shuttle bus to/from Locarno, to/from hotels

On arrival and departure day Hotel Monte Verità will take care of the transportation of conferees between Locarno train station and Monte Verità. Conferees staying at hotels in Ascona other than Hotel Monte Verità will be picked up daily by a shuttle bus. Detailed directions will be transmitted to attendees after registration.

Winterschool Office

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EMPA AKADEMIE
Zentrum für Wissenstransfer

ETH
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

Centro
Stefano Franscini

PhD Winterschool

Dielectric Elastomer Transducers

Monte Verità
Ascona, Switzerland

January 10 until 16, 2010

Registration online at
www.empa.ch/eap-winterschool

Background

In the last decade the interest for “smart materials”, which respond to external stimuli by changing their shape or size, has increased. Besides the more classical approaches new materials including hydrogels, electro active-, shape memory- and conducting polymers as well as carbon nanotubes and ferroelectric liquid crystalline elastomers have been investigated. In particular, dielectric elastomers are functional materials that have promising potential as actuators with muscle-like mechanical properties for high actuation performance with high compliance. Although large electro-mechanical strains have been observed the main obstacle for industrial implementation lies in the required reliability and possibility of combining different physical and electro-mechanical performance features. Thus, synthesis of novel materials and thin film processing along with modelling for behaviour prediction are the main topics of worldwide research activities. The event represents an excellent occasion to discuss experiences and lessons learned, which is necessary for the requierd actuation improvement under practical conditions.

Winterschool Scope

Dielectric elastomer (DE) transducers technology represents the main topic of the Winterschool 2010. For practical reasons it is of paramount interest to maximize the specific actuation performance by combining scientific findings from different laboratories. In this context it is foreseen to team PhD students from all over the world involved in DE transducers research activities but particularly specialized in different scientific disciplines. The main goal of this event is to analyze all major chemical, physical and electro-mechanical topics, addressing critical scientific questions. Thus, we intend to arrange workshop groups with PhD students educated in different scientific disciplines under the leadership of experienced scientists. Lectures by internationally recognized experts and subsequent exercises and group discussions will be arranged for this advanced training.

Audience

PhD students, researchers and engineers in the fields of actuator technology, polymer physics, material science, control system and device fabrication.

Program

Sunday, January 10, 2010

Welcome drinks and reception dinner (from 6pm on)

Monday to Friday, January 11 until 15, 2010

Fundamentals:

Physics of elastic dielectric polymer systems

Consolidated knowledge about basic principles of polymers as dielectric and their electro-mechanical properties in interaction with the electrode.

Chemistry:

Synthesis of new elastomer materials

Feasibility requirements of dielectric elastomers with high relative permittivity, low deformation modulus and high electric breakdown strength based on chemical and physical effects.

Processing:

Application technology of electrode material

Different design and application methods of the electrode material mostly consisting of micro- or nano size particles.

Processing:

Manufacturing techniques and handling of DE transducers

Conventional methods and new approaches for manufacturing processes of thin film multilayer DE devices.

Modelling:

Designing based on continuum mechanics and computational tools

Quantified prediction of actuator behaviour and failure mode analysis based on advanced modelling techniques.

Controlling:

Charging – discharging behaviour and actuation controlling

Voltage and charge controlled actuation in different frequency and amplitude domains.

Saturday, January 16, 2010

Visit of EAP laboratory and practical workshop at Empa in Dübendorf (Zürich)

Fees and Payments

Full board lodging: € 460 ($ 690)
per person and for 6 days
in the hotel Monte Verità, Ascona
(to be paid at the reception desk)

School/Training for 5 days school in the
Centro Stefano Franscini (all courses included):
PhD students: € 150 ($ 220)
Other scientists: € 300 ($ 450)

Registration

Please register on our website:
www.empa.ch/eap-winterschool

or use the attached registration form. Registration deadline is **December 24, 2009**. The number of participants is limited. Early replies will be favoured. The number of single rooms available at Hotel Monte Verità is very limited, thus we appreciate your willingness to share a room with another participant. For your and our convenience, you will be able to indicate the name(s) of persons with whom you would be willing to share a double room in the registration form.

Cancellation

Cancellations **before December 31, 2009** are free of charge. For later cancellations the full fee will be charged. A replacement will be accepted.